

2. A FEEDING ASSOCIATION BETWEEN A HETEROPTERAN BUG AND LANGURS

Animals have often been observed to scavenge food wasted by primates (e.g. Elder & Elder 1970, Glander 1979, Newton in prep.), but all such associations appear to be opportunistic and facultative. Observations from central India, presented here, suggest an obligate commensalism in which bug nymphs feed solely on fruit dropped by monkeys from one tree species.

Scattered through the sal (*Shorea robusta*) or moist deciduous forest surrounding the central meadows of Kanha Tiger Reserve (Mandla District, Madhya Pradesh) are isolated boulder-strewn hillocks vegetated with mixed (dry deciduous) forest. On one of these hillocks (locally called "chattans") 1 km. east of Kanha Forest Village (at 22° 17' 15" N, 80° 30' 03" E) "kosum" trees (*Schleichera oleosa*, Sapindaceae) fruited in May, June and July, straddling the end of the hot season and early monsoon. Their green ovoid fruits are 2.5-3.0 cm in diameter and, within a hard coat, contain a pulpy, acidic, mucilaginous arillus surrounding oily cotyledons (Brandis 1874). Common langurs, *Presbytis entellus*, Colobinae, when feeding on these fruits, rejected and dropped to the ground the coat with some of the arillus coating the inside surface. Frequent feeding by langurs resulted in a considerable quantity of fruit debris accumulating below the canopy.

During May, June and July of 1980, 1981 and 1982 I noted that beneath all fruiting kosum trees on the chattan, there were large populations of the bug *Leptocoris augur* (Fabricius 1781) (Hemiptera, Rhopalidae). None were observed from August to April inclusive in any year. During the hot season (May to mid-June) the bugs, mainly nymphs, were

found exclusively below the kosums with none more than 1 metre from the canopy's vertical projection to the ground. Nor were the bugs found more than 1 metre up the tree bole. On 18 June 1981, 510 nymphs and adults of *L. augur* were counted below the canopy of a single tree (approximately 50 m² cross-sectional area). The majority of the bugs were aggregated at the fruits with their probosci extended into the exposed mucilaginous arillus. Bugs congregated at intact fruits but did not feed, being unable to reach the mucus through the hard coat. When I broke open a monkey felled fruit, in the manner of a langur and placed it below the canopy, twenty bugs converged on the fruit within two minutes.

Although most tree species in the area fruited in the hot season, the bugs only occurred below kosums and was the only species noted scavenging the fruits. The bugs, which also occurred below fruiting kosums on adjacent chattans, were rarely seen to utilize other food sources such as the leaves of bamboo, saplings and herbs. Since opened fruits are dropped only by langurs the bug is dependent on the primate for processing an otherwise inaccessible food source. These observations suggest that during the hot weather the bug is monophagous and host specific.

However with the arrival of the monsoon (23 June in 1981) the behaviour of *L. augur* changed dramatically. The bugs, now mostly matured into imagos, dispersed from the kosums and were found scattered over the chattan feeding on grasses, herbs and saplings. They were not found in the tree canopies or the surrounding sal forest and were no longer aggregated below kosums. The sudden dispersal of bugs coincided with the arrival of the

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monsoon and not with the browning of the fruits, which mostly occurred in late June. Langurs continued to feed on the drying brown fruits and a few bugs remained below the kosums scavenging the reduced quantity of arillus present on the fruit debris.

These observations suggest a commensalism in which during the hot season *L. augur*, mostly as nymphs, may be obligatorily dependent on langurs for their food. With the arrival of the monsoon, the vegetation flushes, the climate ameliorates and the bugs are 'released' from the association, dispersing from the kosums. Concurrently they switch from being frugivorous specialists to phytophagous generalists. An additional advantage in living beneath kosum trees is that the microclimate is relatively benign owing to the leafed canopy. Most other sympatric tree species are leafless during this season and therefore, below their skeletal canopies, associating bugs would be subjected to high heat stress and water loss (temperatures to 44°C in shade).

I suggest that the bug's dependence on a

shady tree and a prodigal primate evolved to facilitate its survival and growth during the invertebrate depauperate, hot, dry summer. The selective advantage of this shift in life history, from the usual pattern of nymphal development in the monsoon, may be that the nymphs avoid the competition, predation, parasitism and fungal attack which are at their worst in the monsoon. However, if *L. augur*, is an obligate commensal, it is dependent on the vagaries of langur ranging and feeding, for the survival and growth of its nymphs.

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PAUL N. NEWTON

DEPARTMENT OF ZOOLOGY,
ANIMAL ECOLOGY RESEARCH GROUP,
SOUTH PARKS ROAD,
OXFORD OX1 3P5, U.K.,
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